

REMARKS

Claims 1-42 were pending. By the above amendments, the applicants have amended claims 1-6, 8, 9, 15-24, 36, 37, 41 and 42. Accordingly, claims 1-42 are currently pending. The applicants hereby request further consideration and re-examination in view of the amendments made above and remarks set forth below.

Specification Amendments and Specification Objection:

The title of the invention has been amended to be consistent with the preamble of claim 1.

The related applications section has been amended to replace attorney docket numbers and “filed (on the same day as this application)” with application numbers and Jul. 25, 2003, respectively. This amendment addresses the specification objection provided in the Office Action that requested that the attorney docket numbers in the related applications section be replaced with the application numbers.

The field of the invention has been replaced with the field of the invention from related application U.S. Pat. App. No. 10/627,324 (attorney docket no. 200209179-1), which more accurately describes the field of the invention of the amended claims. All of the contents of U.S. Pat. App. No. 10/627,324 was incorporated by reference in the originally filed application according to the related applications section.

The background section has been amended to correct a grammatical error where the words “integer linear program” should be “linear integer program.”

The background section has been amended to include a portion of the background from related application U.S. Pat. App. No. 10/627,324.

The summary of the invention has been amended to describe claim 1 as amended.

The brief description of the drawings section has been amended to replace the word “aspect” with the word “embodiment.”

The brief description of the drawings section has been amended to include figures 1-6 from related application U.S. Pat. App. No. 10/627,324, which have been renumbered in the subject application as figures 5-10, respectively.

The detailed description of a preferred embodiment has been amended in its first paragraph to more accurately identify the present invention according to the amended claims.

The detailed description of a preferred embodiment has been amended to incorporate a portion of the detailed description of a preferred embodiment from related application U.S. Pat. App. No. 10/627,324 with appropriate edits so that the detailed description is readable.

The abstract has been amended to describe claim 1 as amended.

No new matter has been added by these amendments.

Drawing Amendments:

New drawing sheets 4 through 6 are attached. These new drawing sheets show figures 5-10, which are figures 1-6 from U.S. Pat. App. No. 10/627,324 with appropriate edits of reference numerals to avoid confusion with reference numerals for figures 1-4 of the subject application.

All of the contents of U.S. Pat. App. No. 10/627,324 was incorporated by reference in the originally filed application according to the related applications section. Therefore, no new matter has been added by these drawing amendments.

Claim Amendments:

Claims 1-6, 8, 9, 15-24, 36, 37, 41 and 42 have been amended. Independent claims 1 and 20 have been amended to include a real world application of the algorithm claimed in the original claims, as discussed below. The support for these amendments is found in the amended detailed description in the matter inserted from U.S. Pat. App. No. 10/627,324. Other amendments clarify claim language. No new matter has been added by these amendments.

Claim Rejections under 35 U.S.C. §101:

The Office Action rejects claims 1-42 as being directed to non-statutory subject matter under 35 U.S.C. § 101. In particular, the Office Action rejects claims 1-42 as

being directed to a non-statutory process that does not claim a practical application with a tangible result.

Independent claims 1 and 20 have been amended to add the practical application and tangible result of “determining a value change for a placement variable as part of a local search solution to an integer programming problem that models placement of services of a distributed application onto nodes of a distributed resource infrastructure.”

Moreover, it should be noted that these claims recite manipulation of variables maintained in “stores,” which according to the applicants’ specification, are in computer memory. Applicants’ specification at page 7, line 33 to page 8, line 10. These claims recite tangible transformations which occur within specific hardware elements of a machine

Accordingly, the applicants assert that claims 1 and 20, as amended, are drawn to statutory subject matter because they recite a useful, concrete and tangible result.

The applicants respectfully traverse the rejection of claims 21, 22 and 41. These claims are clearly statutory because each is directed toward a program storage medium readable by machine that embodies an executable computer program. It is well-accepted that a computer program is functional descriptive material and, when stored on a computer-readable medium, such functional descriptive material is statutory subject matter. As stated in the Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility, Annex IV (Official Gazette, 22 November 2005):

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. ... "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data. ... When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. ... Only when the claimed invention taken as a whole is directed to a mere program listing, i.e., to only its description or expression, is it descriptive material per se and hence nonstatutory. Since a computer program is merely a set of instructions capable of being executed by a computer, the computer program itself is not a process and USPTO personnel should treat a claim for a computer program, without the computer-readable medium needed to realize the computer program's functionality, as nonstatutory functional descriptive material.

Claims 21, 22 and 41 each recites a computer program which is functionally interrelated to a medium upon which it is stored. This is because use of technology permits the function of the program to be realized. Accordingly, the applicants assert that claims 21, 22 and 41 are drawn to statutory subject matter.

Claim Rejections under 35 U.S.C. §102:

Claims 1, 6-8, 10, 12, 13, 15, 17, 19, 21, 22, 27-29, 31, 33, 34, 36, and 42 were rejected under 35 USC §102(b) as being anticipated by U.S. Pat. No. 6,031, 984 issued to Walser. The applicants respectfully traverse the rejection with regards to the amended claims provided above.

U.S. Pat. No. 6,031, 984 issued to Walser:

Walser in U.S. Pat. No. 6,031,984, issued on Feb. 29, 2000, and entitled, "Method and Apparatus for Optimizing Constraint Models," teaches a method of optimizing an over-constrained system. In step 10, an over-constrained integer program that models the over-constrained system is defined or generated. (Col. 5, lines 25-36, and Fig. 1.) In step 12, an initial assignment of all of the variables is made for the over-constrained integer program. (Col. 5, lines 47-48, and Fig. 1.) In step 14, an unsatisfied constraint is selected. Step 15 selects a variable from the unsatisfied constraint and determines a new value for the variable. Step 16 changes the value of the variable to the new value. An implementation of steps 14, 15, and 16 is provided in detail in Fig. 2 and the accompanying discussion of Fig. 2. (Col. 5, lines 59-64, and Fig. 1.)

It is noted that the steps 10 through 16 are also described by Walser in the section titled, "Summary of the Invention," (Col. 2, line 61-col. 3, line 20), which is referred to by the Examiner in the rejection of claim 1 and other claims.

Walser further teaches problem models for the over-constrained integer program as sets of linear equations. (Col. 6, lines 23-63, and col. 8, lines 30-58.) Walser further teaches that a score measures the degree of violation of a particular linear constraint under evaluation. The score may be adjusted by a constraint weight. (Col. 7, lines 14-38.)

With respect to Fig. 2, Walser teaches that step 30 stochastically selects an unsatisfied constraint. In step 31, variable changes are scored for the selected constraint.

All variables are scored that can be changed. For each variable, one or more values from its domain are selected and, for each value, the new total score of the altered current assignment is computed. In step 32, the variable-value pair that most improves the total score is selected. (Col. 7, line 63-col. 8, line 5.)

Thus, Walser teaches that the score that is used for determining the value change for a variable of a constraint as part of a local search solution of an integer program is computed (i.e., calculated).

Claims 1 and 22:

Claims 1 and 22 were rejected as being anticipated by Walser. The applicants respectfully traverse the rejection as applied to the amended claims. Claims 1 and 22 are independent claims. Claim 1 is a method of determining a value change for a placement variable as part of a local search solution to an integer programming problem that models placement of services of a distributed application onto nodes of a distributed resource infrastructure. Claim 22 is a computer readable memory comprising computer code for implementing the method of determining the value change for the placement variable.

Claim 1 includes the following limitations:

- selecting an unsatisfied communication constraint that includes a sum of terms, at least some of the terms comprising products of placement variables;

- creating stores for allowable changes of value for the placement variables in the unsatisfied communication constraint;

- parsing through the unsatisfied communication constraint by term and for each placement variable in the term updating the stores with a change in the term for each of the allowable changes of the value while maintaining other placement variables constant

Claim 22 includes the following limitations:

- selecting an unsatisfied constraint that includes a sum of terms, at least some of the terms comprising products of variables;

- creating stores in memory for allowable changes of value for the variables in the unsatisfied constraint;

- parsing through the unsatisfied constraint by term and for each variable in the term updating the stores with a change in the term for each of the allowable changes of the value while maintaining other variables constant

There are several differences between these limitations and Walser. With respect to claim 1, Walser does not teach “an unsatisfied communication constraint” nor

“placement variables.” With respect to claims 1 and 22, Walser does not teach “a ... constraint that includes a sum of terms [where] at least some of the terms compris[e] products of ... variables. And, Walser does not teach “parsing through the ... constraint by term [where at least some of the terms comprise products of the variables] and for each ... variable in the term updating the stores with a change in the term for each of the allowable changes of the value while maintaining other ... variables constant.” Rather, Walser teaches selecting an unsatisfied constraint that includes linear terms and computing scores for allowable changes of the variables.

To anticipate a claim, a prior art reference must teach each and every limitation of the claim. Not only does Walser not teach each and every limitation of claims 1 and 22, Walser fails to teach many of the limitations of claims 1 and 22. Accordingly, claims 1 and 22 are allowable and an early allowance would be greatly appreciated.

Claims 21 and 42:

Claims 21 and 42 were rejected as being anticipated by Walser. The applicants respectfully traverse the rejection as applied to the amended claims. Claims 21 and 42 are independent claims. Claim 21 is a method of determining a value change for a placement variable as part of a local search solution to an integer programming problem that models placement of services of a distributed application onto nodes of a distributed resource infrastructure. Claim 42 is a computer readable memory comprising computer code for implementing the method of determining the value change for the placement variable. Each includes limitations similar to those discussed above relative to claims 1 and 22. Particularly, claim 21 includes the following limitations:

- selecting an unsatisfied communication constraint that includes a sum of terms, at least some of the terms comprising products of placement variables;
- creating stores for allowable changes of value for the placement variables in the unsatisfied communication constraint;
- parsing through the unsatisfied communication constraint by term and for each placement variable in the term which is encountered for a first time updating the stores with a change in the unsatisfied communication constraint for each of the allowable changes of the value while maintaining other variables constant

Claim 42 includes the following limitations:

- selecting an unsatisfied communication constraint that includes a sum of terms, at least some of the terms comprising products of variables;
- creating stores in memory for allowable changes of value for the variables

in the unsatisfied constraint;

parsing through the unsatisfied constraint by term and for each variable in the term which is encountered for a first time updating the stores with a change in the unsatisfied constraint for each of the allowable changes of the value while maintaining other variables constant

As discussed above, there are several differences between these limitations and Walser. Particularly, with respect to claim 21, Walser does not teach “an unsatisfied communication constraint” nor “placement variables.” With respect to claims 21 and 42, Walser does not teach “a ... constraint that includes a sum of terms [where] at least some of the terms compris[e] products of ... variables. And, Walser does not teach “parsing through the ... constraint by term [where at least some of the terms comprise products of the variables] and for each ... variable in the term which is encountered for a first time updating the stores with a change in the unsatisfied ... constraint for each of the allowable changes of the value while maintaining other variables constant.” Rather, Walser teaches selecting an unsatisfied constraint that includes linear terms and computing scores for allowable changes of the variables.

To anticipate a claim, a prior art reference must teach each and every limitation of the claim. Not only does Walser not teach each and every limitation of claims 21 and 42, Walser fails to teach many of the limitations of claims 21 and 42. Accordingly, claims 21 and 42 are allowable and an early allowance would be greatly appreciated.

Claims 6-8, 10, 12, 13, 15, 17, 19, 27-29, 31, 33, 34, and 36:

Claims 6-8, 10, 12, 13, 15, 17, 19, 27-29, 31, 33, 34, and 36 were rejected as being anticipated by Walser. The applicants respectfully traverse the rejection as applied to these claims.

In the interest of brevity, the applicants note that claims 6-8, 10, 12, 13, 15, 17, 19 are dependent claims that depend from allowable base claim 1 and that claims 27-29, 31, 33, 34, and 36 are dependent claims that depend from allowable base claim 22. According, for at least these reasons, claims 6-8, 10, 12, 13, 15, 17, 19, 27-29, 31, 33, 34, and 36 are allowable and an early allowance would be greatly appreciated.

Conclusion:

In view of the above, the applicants submit that all of the pending claims are now allowable. Allowance at an early date would be greatly appreciated. Should any outstanding issues remain, the Examiner is encouraged to contact the undersigned at (408) 293-9000 so that any such issues can be expeditiously resolved.

Respectfully Submitted,

Dated: Sept. 27, 2006

A handwritten signature in black ink, appearing to read 'Derek J. Westberg', is written over a horizontal line.

Derek J. Westberg (Reg. No. 40,872)



AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings add Figures 5-10. These are the same as Figures 1-6 from related application U.S. Pat. App. No. 10/627,324, but renumbered as Figures 5-10, respectively. U.S. Pat. App. No. 10/627,324 was incorporated by reference.